

1 WHAT IS CLAIMED IS:

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3 1. A method for preparing silica containing molecular sieves which may  
4 be mixed with an organic polymer to create a mixed matrix membrane,  
5 the method comprising:

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7 water washing silica containing molecular sieves sufficiently to produce  
8 water washed molecular sieves which are substantially free of surface  
9 remnants, such that when the water washed molecular sieves are  
10 subjected to a Sieve Wash Conductivity Test, a wash filtrate is  
11 produced having a conductivity of less than 110 micro mhos/cm.

12

13 2. The method of claim 1 wherein:

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15 the conductivity is less than 80 micro mhos/cm.

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17 3. The method of claim 1 wherein:

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19 the conductivity is less than 50 micro mhos/cm.

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21 4. The method of claim 1 wherein:

22

23 the conductivity is less than 30 micro mhos/cm.

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25 5. The method of claim 1 further comprising:

26

27 a step of washing the silica containing molecular sieves with a basic  
28 water solution having a pH of at least 9 prior to the water washing step.

29

30 6. The method of claim 5 wherein:

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32 the basic water solution has a pH of at least 11.

- 1     7.     The method of claim 1 wherein:  
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3         the water washing is performed continuously until the silica containing  
4         molecular sieves are substantially free of the surface remnants.  
5
- 6     8.     The method of claim 1 wherein:  
7  
8         the water washing is performed batch wise until the silica containing  
9         molecular sieves are substantially free of the surface remnants.  
10
- 11    9.     The method of claim 1 further comprising:  
12  
13         calcining the silica containing molecular sieves after the step of water  
14         washing has produced sieves which are substantially free of surface  
15         remnants.  
16
- 17    10.    The method of claim 1 further comprising:  
18  
19         silanating the water washed silica containing molecular sieves.  
20
- 21    11.    A mixed matrix membrane comprising:  
22  
23         a continuous phase organic polymer and water washed silica  
24         containing molecular sieves which are dispersed throughout the  
25         polymer;  
26  
27         wherein the water washed silica containing molecular sieves are  
28         sufficiently water washed to remove surface remnants prior to being  
29         dispersed into the organic polymer such that if the water washed silica  
30         containing molecular sieves are subjected to a  
31         Sieve Wash Conductivity Test, a wash filtrate is produced having a  
32         conductivity of less than 110 micro mhos/cm.

- 1 12. The mixed matrix membrane of claim 11 wherein:  
2  
3 the water washed silica containing molecular sieves are sufficiently  
4 water washed to remove surface remnants prior to being dispersed into  
5 the organic polymer such that if the water washed silica containing  
6 molecular sieves are subjected to a Sieve Wash Conductivity Test, a  
7 wash filtrate is produced having a conductivity of less than  
8 80 micro mhos/cm.  
9
- 10 13. The mixed matrix membrane of claim 11 wherein:  
11  
12 the water washed silica containing molecular sieves are sufficiently  
13 water washed to remove surface remnants prior to being dispersed into  
14 the organic polymer such that if the water washed silica containing  
15 molecular sieves are subjected to a Sieve Wash Conductivity Test, a  
16 wash filtrate is produced having a conductivity of less than  
17 50 micro mhos/cm.  
18
- 19 14. The mixed matrix membrane of claim 11 wherein:  
20  
21 the water washed silica containing molecular sieves are sufficiently  
22 water washed to remove surface remnants prior to being dispersed into  
23 the organic polymer such that if the water washed silica containing  
24 molecular sieves are subjected to a Sieve Wash Conductivity Test, a  
25 wash filtrate is produced having a conductivity of less than  
26 30 micro mhos/cm.  
27
- 28 15. The mixed matrix membrane of claim 11 wherein:  
29  
30 the water washed silica containing molecular sieve is silanated prior to  
31 being dispersed with the organic polymer.

- 1 16. A method of making a mixed matrix membrane, the method comprising  
2 the steps of:  
3  
4 water washing silica containing molecular sieves sufficiently to produce  
5 water washed molecular sieves which are substantially free of surface  
6 remnants, such that when the water washed molecular sieves are  
7 subjected to a Sieve Wash Conductivity Test, a wash filtrate is  
8 produced having a conductivity of less than 110 micro mhos/cm;  
9  
10 dispersing the water washed molecular sieves into a solvated organic  
11 polymer; and  
12  
13 allowing the organic polymer to dry thereby creating a mixed matrix  
14 membrane comprising an organic polymer with the water washed  
15 molecular sieves dispersed therein.  
16
- 17 17. The method of claim 16 wherein:  
18  
19 the wash filtrate has a conductivity of less than 80 micro mhos/cm.  
20
- 21 18. The method of claim 16 wherein:  
22  
23 the wash filtrate has a conductivity of less than 50 micro mhos/cm.  
24
- 25 19. The method of claim 16 wherein:  
26  
27 the wash filtrate has a conductivity of less than 30 micro mhos/cm.  
28
- 29 20. A process for separating component gases of a gas mixture comprising  
30 the steps of:  
31  
32 providing a mixed matrix membrane comprising molecular sieves  
33 dispersed in a continuous phase of a polymer in which the sieves have

1        been sufficiently super water washed prior to being incorporated into  
2        the continuous phase to be substantially free of surface remnants, such  
3        that when the water washed molecular sieves are subjected to a  
4        Sieve Wash Conductivity Test, a wash filtrate is produced having a  
5        conductivity of less than 110 micro mhos/cm;  
6  
7        contacting a gas mixture, including component gases, on one side of  
8        the membrane to cause the component gases to selectively permeate  
9        the membrane; and  
10  
11       removing from the opposite side of the membrane a permeate gas  
12       composition enriched in concentration in at least one of the component  
13       gases.  
14  
15    21.    The process of claim 20 wherein:  
16  
17       the wash filtrate has a conductivity of less than 80 micro mhos/cm.  
18  
19    22.    The process of claim 20 wherein:  
20  
21       the wash filtrate has a conductivity of less than 50 micro mhos/cm.  
22  
23    23.    The process of claim 20 wherein:  
24  
25       the wash filtrate has a conductivity of less than 30 micro mhos/cm.